

**MUNICIPAL AND INDUSTRIAL
WATER SUPPLY AND USES
in the
UINTAH BASIN**

(Data Collected for Calendar Year 1995)

Prepared by

**Utah Department of Natural Resources
Division of Water Resources**

JULY 1998

(Revised December 2000)

ACKNOWLEDGMENTS

This water study was conducted under the direction of Paul L. Gillette, deputy director, and supervised by Lloyd H. Austin, chief, Resource Inventories and Special Studies Section, Utah State Division of Water Resources. Staff members assisting in the preparation of this report and/or in the data collection and analysis were Eric K. Klotz and David G. Peterson. Appreciation is expressed to the various water suppliers and the Division of Water Rights for supplying information for this report.

D. Larry Anderson, Director

TABLE OF CONTENTS

ACKNOWLEDGMENTS	I
TABLE OF CONTENTS	iii
LIST OF FIGURES	v
LIST OF TABLES	vii
EXECUTIVE SUMMARY	ix
INTRODUCTION	1
Authority	1
Scope	1
Data Collection	1
General Description of the Basin	3
WATER SUPPLY AND USE METHODOLOGY	7
Background	7
Present Methodology for Community Water Systems	7
Present Methodology for Non-Community Water Systems	16
Present Methodology for Self-Supplied Industrial Water Systems ..	17
Present Methodology for Private Domestic Water Systems	17
DEFINITIONS OF WATER TERMS	19
Water Supply Terms	19
Water Use Terms	21
Other Water Terms	22
WATER RIGHTS IN THE UINTAH BASIN	25
Daggett, Duchesne and Uintah Counties	25
Wasatch County	25
DAGGETT COUNTY M&I WATER SUPPLIES AND USES	27
DUCHESNE COUNTY M&I WATER SUPPLIES AND USES	31
SUMMIT COUNTY M&I WATER SUPPLIES AND USES	35
UINTAH COUNTY M&I WATER SUPPLIES AND USES	37
WASATCH COUNTY M&I WATER SUPPLIES AND USES	41

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1	Location of Study Area	2
2	Uintah Basin Drainage Map	4
3	Location of Public Community Systems	5
4	Water Supply and Use Hydrograph	13

LIST OF TABLES

<u>Table</u>	<u>Page</u>
I	1996 Public Community System Water Supplies ix
II	1996 Public Community System Water Use x
III	1996 Total Municipal and Industrial Water Use xi
1	Daggett County Maximum Potable Water Supplies for Public Community Systems 27
2	Daggett County Water Use and Supply For Public Community Systems 28
3	Daggett County Secondary (Non-Potable) Water Use Within Public Community Systems 29
4	Daggett County Water Use For Public Non-Community Systems, Self-supplied Industries, and Private Domestic Systems 29
5	Daggett County Average Per Capita M&I Water Use For All Public Community Systems 30
6	Duchesne County Maximum Potable Water Supplies for Public Community Systems 31
7	Duchesne County Water Use and Supply For Public Community Systems 32
8	Duchesne County Secondary (Non-Potable) Water Use Within Public Community Systems 33
9	Duchesne County Water Use For Public Non-Community Systems, Self-supplied Industries, and Private Domestic Systems 34
10	Duchesne County Average Per Capita M&I Water Use For All Public Community Systems 34
11	Summit County Water Use For Public Non-Community Systems, Self-supplied Industries, and Private Domestic Systems 35
12	Uintah County Maximum Potable Water Supplies for Public Community Systems 37

LIST OF TABLES (Continued)

13	Uintah County Water use and Supply For Public Community Systems	38
14	Uintah County Secondary (Non-Potable) Water Use Within Public Community Systems	39
15	Uintah County Water Use For Public Non-Community Systems, Self-supplied Industries, and Private Domestic Systems	40
16	Uintah County Average Per Capita M&I Water Use For All Public Community Systems	40
17	Wasatch County Water Use For Public Non-Community Systems, Self-supplied Industries, and Private Domestic Systems	41

EXECUTIVE SUMMARY

This document describes the municipal and industrial (M&I) water supplies and uses for the Uintah Basin. Total M&I water supplies and uses for the basin are computed by tabulating the results of the five counties that comprise the basin. These counties are Daggett, Duchesne, Uintah and portions of Summit and Wasatch. County data are compiled by meeting and surveying each public community and non-community system. The results reported herein represent totals for the 1995 calendar year.

The basin's maximum annual potable water supply under present conditions for Public Community Systems is 39,731 acre-feet. Springs account for 25 percent of this total, wells 22 percent, and surface sources 53 percent. The reliable system source capacity for these systems is 18,133 acre-feet. Table I presents this data.

TABLE I
UINTAH BASIN
Maximum Culinary Water Supplies for Public Community Systems
(Units in Acre-Feet)

Source	Daggett County	Duchesne County	Summit County	Uintah County	Wasatch County	Total
Springs	227.0	5,369.7	0.0	4,135.0	0.0	9,731.7
Wells	429.3	8,378.8	0.0	20.0	0.0	8,828.1
Surface	822.0	784.5	0.0	19,564.5	0.0	21,171.0
TOTALS	1,478.3	14,533.0	0.0	23,719.5	0.0	39,730.8
Reliable System Source Capacity	626.5	6,581.3	0.0	10,925.1	0.0	18,132.8

M&I water use can be divided into two categories: potable (culinary) and non-potable (secondary). Potable water is delivered by public community, public non-community, self-supplied industrial, and private domestic systems. Non-potable uses include residential and institutional secondary water usually delivered by separate irrigation companies and secondary water used by self-supplied industries. Table II presents water use data for the potable and non-potable categories

delivered by public community systems. The table shows that the residential indoor category accounts for 30 percent, residential outdoor 36 percent, commercial 7 percent, institutional 19 percent, and light industrial 8 percent of the total public community system water use (12,219 acre-feet) in the basin.

TABLE II
UINTAH BASIN
Water Use for Public Community Systems
(Units in Acre-Feet)

Source	Daggett County	Duchesne County	Summit County	Uintah County	Wasatch County	Total
<i>Potable Uses:</i>						
Residential Indoor	172.7	1,224.6	0.0	2,216.0	0.0	3,613.3
Residential Outdoor	206.5	424.6	0.0	2,222.7	0.0	2,853.8
Commercial	33.0	196.5	0.0	652.1	0.0	881.6
Institutional	80.6	284.0	0.0	850.0	0.0	1,214.6
Industrial/Stockwater	13.3	688.1	0.0	324.9	0.0	1,026.3
TOTAL CULINARY	506.1	2,817.8	0.0	6,265.7	0.0	9,589.6
<i>Non-Potable Uses:</i>						
Residential	10.0	444.5	0.0	1,065.2	0.0	1,519.7
Commercial	10.0	0.0	0.0	0.0	0.0	10.0
Institutional	35.3	505.3	0.0	558.3	0.0	1,098.9
Industrial/Stockwater	0.3	0.0	0.0	0.0	0.0	0.3
TOTAL SECONDARY	55.6	949.8	0.0	1,623.5	0.0	2,628.9
TOTAL WATER USE	561.7	3,767.6	0.0	7,889.2	0.0	12,218.5

Table III presents the total M&I water use in the Uintah Basin. Public community systems deliver the majority of the potable water in the basin. The table shows that the total potable M&I water use in 1995 is 14,753 acre-feet. Non-potable M&I water use for the basin is 9,674 acre-feet. Therefore, total M&I (potable and non-potable) water use in the basin is about 24,427 acre-feet.

For 1995, population from public community systems in the Uintah Basin was 35,778. Residential potable per capita water use is 161 gallons per capita per day (gpcd). Non-potable water use amounts to 38 gpcd resulting in uses of 199 gpcd for residential purposes within the public community systems of the basin. Furthermore, by adding commercial, institutional and industrial uses, public community systems use jumps to 239 gpcd for potable uses and 66 gpcd for non-potable uses for a total of 305 gpcd. Lastly, with a population of 39,245 (including the private domestic

category), the total basin M&I per capita water use including all categories and types of systems is 556 gpcd. Industrial use accounts for much of this above average value.

TABLE III
UINTAH BASIN
Total Municipal and Industrial Water Use for all Categories
(Units in Acre-Feet)

Source	Daggett County	Duchesne County	Summit County	Uintah County	Wasatch County	Total
<i>Potable Suppliers:</i>						
Public Community Systems	506.1	2,817.8	0.0	6,265.7	0.0	9,589.6
Public Non-Community Systems	21.1	22.0	3.0	16.7	52.8	115.6
Self-Supplied Industries	0.0	37.8	0.0	4,134.7	0.0	4,172.5
Private Domestic	15.0	560.0	0.0	300.0	0.0	875.0
TOTAL CULINARY	542.2	3,437.6	3.0	10,717.1	52.8	14,752.7
<i>Non-Potable Suppliers:</i>						
Secondary Irrigation Companies	55.6	949.8	0.0	1,623.5	0.0	2,628.9
Non-Community Systems	0.0	36.0	0.0	9.0	0.0	45.0
Self-Supplied Industries	0.0	0.0	0.0	7,000.0	0.0	7,000.0
Private Domestic	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL SECONDARY	55.6	985.8	0.0	8,632.5	0.0	9,673.9
TOTAL WATER USE	597.8	4,423.4	3.0	19,349.6	52.8	24,426.6

INTRODUCTION

Authority

The Utah Division of Water Resources has overall responsibility for completing studies, investigations, and plans directed at the responsible development and utilization of the water resources of the state of Utah. The State Water Plan, prepared and distributed in early 1990, provided the foundation and overall direction to establish and implement the state policy framework of water management. As part of the state water planning process, detailed plans are prepared for each of the 11 hydrologic basins in the state. The Uintah Basin is one of these 11 reports. Each basin water plan will identify potential conservation and development projects and describe alternatives to satisfy the problems, needs, and demands. As part of this effort, background data reports are completed for each river basin. These include a water-related land use report and a water budget report.

Scope

The subject of this data report is a determination of present municipal and industrial (M&I) water supplies and uses within this basin. The data presented in these reports will be used in the State Water Plan for the Uintah Basin as well as other division reports and studies. The basin is shown in Figure 1. Information considered includes related investigations recently completed by the Division of Water Resources and the Division of Water Rights.

Data Collection

This study was begun in January 1995 by Division staff. The *1995 Municipal and Industrial Water Use Forms*, distributed by the Division of Water Rights, in cooperation with the Division of Water Resources and the Division of Drinking Water, were used and is the basis for the study. In all counties the data collection process is as described in the following section, *Water Supply and Use Methodology*. Water



Figure 1. Location of the Uintah Basin.

rights discussions presented herein were prepared based on conversations with Bob Leake, Area Engineer from the State Engineer's Office that cover the Uintah Basin.

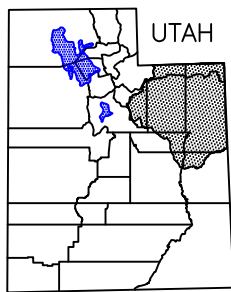
General Description of the Basin

The Uintah Basin is comprised of about 10,890 square miles (6,969,600 acres) of land. The Utah/Wyoming and the Utah/Colorado state lines form much of the basin's northern and eastern boundaries respectively. Portions of the Wasatch Range and the Roan Cliffs comprise the southern and western boundaries.

The basin spans all or part of nine counties: Carbon, Daggett, Emery, Duchesne, Grand, Summit, Uintah, Utah and Wasatch. Carbon, Emery, Grand and Utah counties contain no public water systems, within the basin, and are not included as part of this report. The Upper Green, Ashley-Brush, Uintah, Green and White hydrological study areas comprise the Uintah Basin.

Within the Uintah Basin there is a wide variety of valleys and mountains. The basin has a low elevation of 4,040 feet above mean sea level at a point along the Green River and gradually increases throughout several of the valleys into the higher mountains and plateaus of the Uinta Mountains. Kings Peak stands at 13,528 feet above mean sea level. Other peaks along the same ridge include Mt. Emmons at 13,440 feet, Gilbert Peak at 13,422 and Mt. Lovenia at 13,219 feet above mean sea level. Figure 2 shows a detailed map of the basin.

There are currently 22 public community water systems and 1 unregulated Indian systems in the Uintah Basin. These systems serve 35,778 people (about 91 percent of the 39,245 total population within the basin). Figure 3 shows the location of these systems. The basin also contains 45 public non-community systems. These systems serve National Recreation Areas, State Parks, campgrounds, isolated commercial establishments, and roadside rest stops and parks. In addition, there are 9 self-supplied industries located within the Uintah Basin.



Basin Location

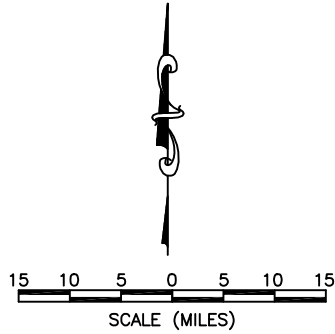
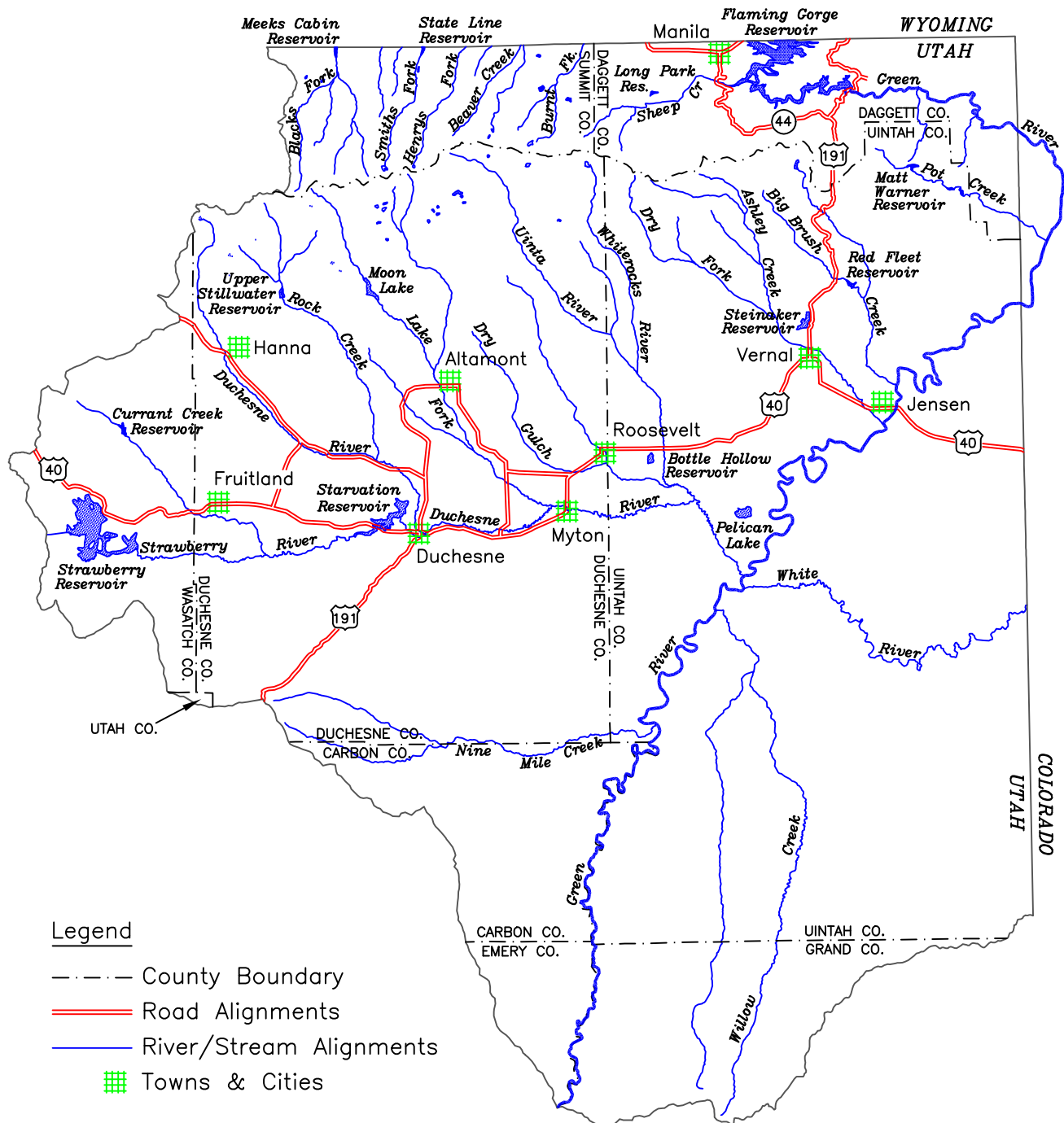


Figure 3-1
LOCATION MAP
Uintah Basin



Legend

- County Boundary
- Road Alignments
- River/Stream Alignments
- Towns & Cities

Figure 2. Uinta Basin Drainage Map.

DAGGETT COUNTY

1. Bureau of Reclamation (Dutch John)
2. Daggett County Water & Sewer
3. Greendale Water Company
4. Manila Municipal Water System
5. Questar Pipeline Company (Clay Basin)

DUCHESNE COUNTY

6. Duchesne Water System
7. Myton Municipal Water System
8. Johnson Water District
9. East Duchesne Improvement District
10. Duchesne County Upper Country WID
11. Fruitland Water Special Service District
12. Roosevelt Municipal Water Systems
13. Neola Water District
14. Tabiona Water System
15. Valley Park Trailer Court

UINTAH COUNTY

16. Ashley Valley Water & Sewer Impr. District
17. Jensen Water Improvement District
18. Maeser Water Improvement District
19. Vernal Municipal Water System
20. Tridell-Lapoint Water Improvement District
21. Ute Indian Tribe Water System
22. Ballard Water Improvement District
23. Ouray Park Water Improvement District

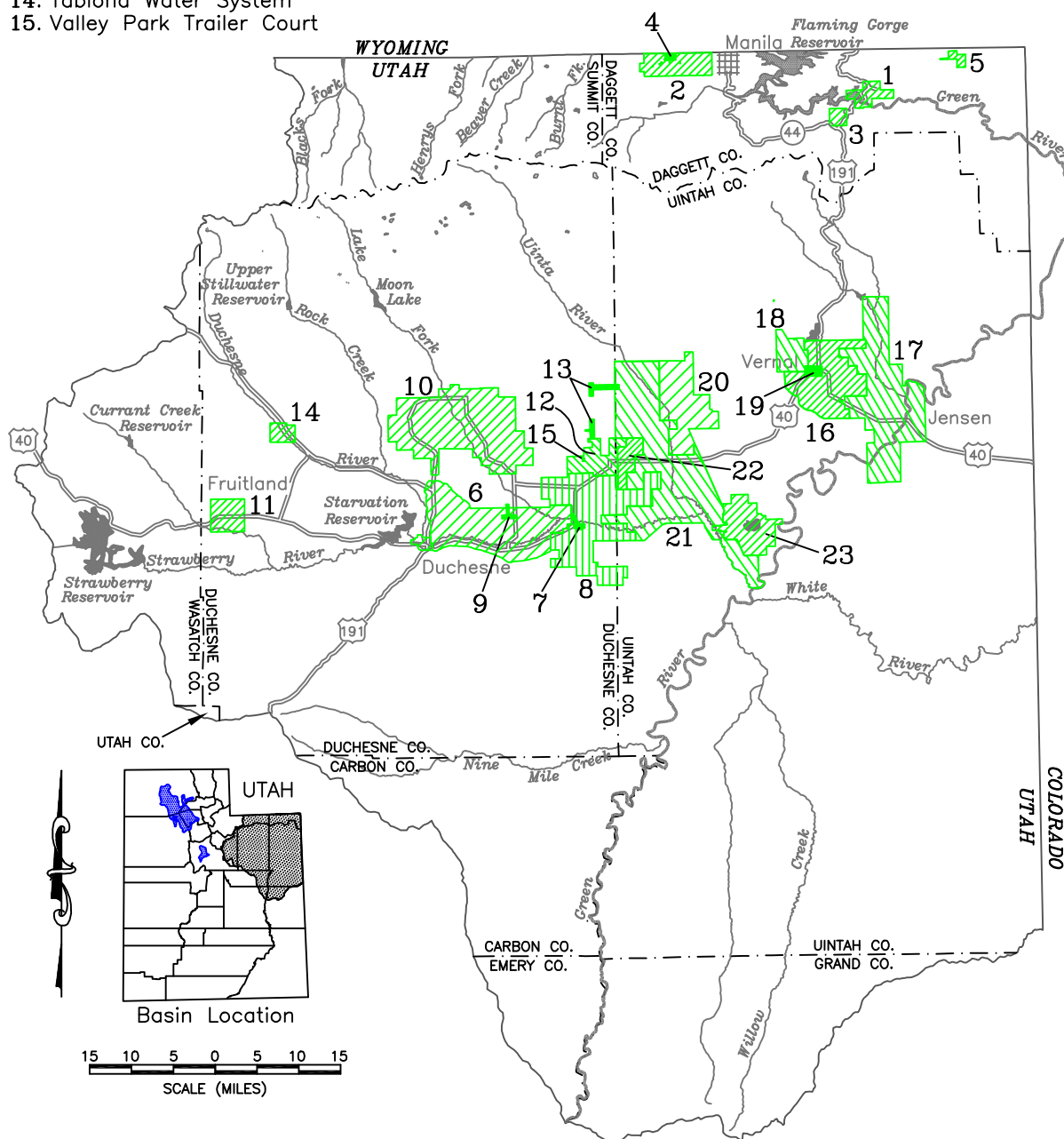


Figure 3 Public Community Systems Within the Uintah Basin

M&I water use is steadily increasing within the basin. Vernal and Roosevelt are currently experiencing the greatest growth. Tourism and industry drive most of this growth and this trend is likely to continue well into the next century.

WATER SUPPLY AND USE METHODOLOGY

Background

Over the past 40 years the Division of Water Resources has employed various procedures to obtain needed M&I data. In recent years, these procedures have become more comprehensive. When the division began water planning in the 1960's, available data consisted mainly of supplies and uses for the entire state. At that time Utah's agriculture uses far exceeded M&I uses. M&I water use was generated by multiplying estimated per capita rates and by census population data.

By the early 1980's, M&I diversions made up a larger percent of all statewide water uses and the entire water community began an increased focus on M&I water supplies and uses. The Division of Water Rights launched a program to collect yearly, statewide M&I data. The procedure involved mailing a survey designed to query each major public water supplier about their sources of water supply. In addition, the United States Geological Survey (USGS) began M&I water use studies. The division relied on both data sources in its planning efforts by the late 1980's.

With the preparation of the State Water Plan Basin reports, the division saw the need to check and improve the quality and quantity of the available data through two methods. The first was to join with the Division of Water Rights to improve their M&I data collection program. Secondly, the division began exploring the accuracy of the data through yearly field surveys described in the following four sections.

Present Methodology for Community Water Systems

Each year, division staff targets a particular hydrologic basin or study area for M&I water supply and use analysis. The division of Water Rights' most recent water use form is the primary analysis tool. As an example, the next three pages exhibit the 1995 form submitted by Duchesne County Upper Country WID Water System.

RECEIVED

Information jointly requested by:

Utah Division of Water Resources, 538-7264;
Division of Drinking Water, 536-4200; and
Division of Water Rights, 538-7392.

UTAH WATER USE DATA FOR FEB 16 1996

DATA FOR 1995

Return completed form to:
Utah Division of Water Rights
1636 West North Temple
Salt Lake City, UT 84116-3156

System Name: Duchesne County Upper Country WID

Address: PO Box 406

Altamont, UT 84001

WATER RIGHTS

Population Served: 1,700 ID #: 1418/07059
Total No. Connections: 425 County: Duchesne
Average Lot Size Served: .25 acre(s).
Estimated Percent of Lot Irrigated unknown %.
Phone Number: (801)454-3513
Phone Number:

Contact Person: ~~XXXXXXXXXX~~ Clyde Watkins

Form filled out by: Clyde Watkins, Ilene D. Jensen

I. STORAGE INVENTORY: Total storage capacity: 1.3 [] Gallons, [] 1000 Gallons, [X] Million Gallons, [] Acre-Feet Number of Tanks 5

II. SOURCE INVENTORY:

1 Source Name: Cow Canyon Spring Nr. 1

Type: SP Location: Sec 15, T2N, R1W, USB&M

Method of Measurement: [X] Master Meter, [] Individual Meters, [] Estimate, [] Other

Units: [] Gallons, [X] 1000 Gallons, [] Million Gallons, [] Acre-Feet

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
1,390	2,595	2,900	5,415	5,000	5,210	7,015	6,760	5,640	4,360	combined w/Dec	3,100	49,385
Are there any spills/overflow? K) Yes, [] No If yes, estimate annual quantity. Where is source measured? [] Before overflow, [X] After overflow												
When do spills/overflow occur? Are spills/overflow included in the quantities reported? [] Yes [X] No												

2 Source Name: Cow Canyon Spring Nr. 2

Type: SP Location: Sec 15, T2N, R1W, USB&M

Method of Measurement: [] Master Meter, [] Individual Meters, [] Estimate, [] Other

Units: [] Gallons, [] 1000 Gallons, [] Million Gallons, [] Acre-Feet

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
Are there any spills/overflow? [] Yes, [] No If yes, estimate annual quantity. Where is source measured? [] Before overflow, [] After overflow												
When do spills/overflow occur? Are spills/overflow included in the quantities reported? [] Yes [] No												

3 Source Name: Johnson Water District

Type: Location:

Method of Measurement: [] Master Meter, [] Individual Meters, [] Estimate, [] Other

Units: [] Gallons, [] 1000 Gallons, [] Million Gallons, [] Acre-Feet

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
0	0	0	0	0	0	0	0	0	0	0	0	0
Are there any spills/overflow? [] Yes, [] No If yes, estimate annual quantity. Where is source measured? [] Before overflow, [] After overflow												
When do spills/overflow occur? Are spills/overflow included in the quantities reported? [] Yes [] No												

.. If you are using other sources which are not shown above, please enter the appropriate data in the space provided below. ..

WR Number:

Type: Location:

Method of Measurement: [] Master Meter, [] Individual Meters, [] Estimate, [] Other
Units: [] Gallons, [] 1000 Gallons, [] Million Gallons, [] Acre-Feet

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL

WR Number:

Type: Location:

Method of Measurement: [] Master Meter, [] Individual Meters, [] Estimate, [] Other
Units: [] Gallons, [] 1000 Gallons, [] Million Gallons, [] Acre-Feet

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL

WR Number:

Type: Location:

Method of Measurement: [] Master Meter, [] Individual Meters, [] Estimate, [] Other
Units: [] Gallons, [] 1000 Gallons, [] Million Gallons, [] Acre-Feet

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL

WR Number:

Type: Location:

Method of Measurement: [] Master Meter, [] Individual Meters, [] Estimate, [] Other
Units: [] Gallons, [] 1000 Gallons, [] Million Gallons, [] Acre-Feet

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL

WR Number:

Type: Location:

Method of Measurement: [] Master Meter, [] Individual Meters, [] Estimate, [] Other
Units: [] Gallons, [] 1000 Gallons, [] Million Gallons, [] Acre-Feet

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL

SOURCE COMMENTS: Water supply conditions were: [] Above normal, [] Normal, [] Below normal

Sources 1 and 2 are combined and metered together.

III. WATER USE BREAKDOWN: (If quantities are not known, please estimate percentages. See instructions for definition of uses shown in bold.)

Units: ☒ Gallons, ☐ 1000 Gallons, ☐ Million Gallons, ☐ Acre-Feet Source of data: ☒ Individual connections ☐ Estimated

Residential: Annual quantity of water delivered for residential purposes -	33,350,000	Total number of residential connections	352
Commercial: Annual quantity of water delivered for commercial purposes -	4,145,900	Total number of commercial connections	25
Industrial: Annual quantity of water delivered for industrial purposes -	4,831,000	Total number of industrial connections	19
Institutional: Annual quantity of water delivered for institutional purposes -	5,335,600	Total number of institutional connections	16
Stockwatering: Annual quantity of water delivered for stockwatering purposes -	1,722,500	Total number of stockwatering connections	13
Wholesale: Annual quantity of water delivered to other systems -	0	Please attach a listing of those supplied.	
Other Uses: Annual quantity of water delivered for other purposes -	0	Total number of other connections	

Describe other uses _____

IV. IRRIGATION SYSTEM (Separate lawn and garden irrigation system, whether controlled by the drinking water supplier or not)

Is your area served by a separate irrigation water system? ☒ Yes, ☐ No If yes, please provide the following information:

What percent of your water customers are served by a separate irrigation system? 95 % How is the water delivered? ☐ Ditch, ☐ Pressurized system

If system is operated by another entity, please give name of company, contact person & phone number: _____

information not known

Number of stock holders: _____ Total shares of stock: _____ Total acres irrigated: _____

Please enter quantity of water delivered by the irrigation system: Institutional acreage Quantity of water

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL

Do these quantities reflect water delivered to the municipal service area only? ☐ Yes, ☐ No If no, percent delivered to municipal service area? _____

V. ADDITIONAL INFORMATION:

Which of the following maps are available? ☒ Service area, ☐ Zoning, ☒ Distribution systems (pipes and ditches)

Can a listing of businesses served by the water system be provided? ☒ Yes, ☐ No

VI. REVENUE SURVEY: (For fiscal ☐ or calendar ☒ year 1995)

What was the revenue for 1995 to your culinary water system from water sales to retail customers? 135,334 ; To wholesale customers? n/a

What was the revenue for 1995 to your culinary water system from taxes, including mill levies? 333,504

What was the revenue for 1995 to your culinary water system from connection or impact fees for new customers? 43,425

What were your total operation and maintenance expenses for 1995? 115,000

** Please attach a copy of your water rate structure. **

What statement best describes the financial condition of your water system?

☒ We meet the usual operation and maintenance expenses of our system from water bill revenues. Our budget is balanced.

☐ Usually, we collect significant excess funds. These funds are put to other uses (e.g. transferred to the sewer system account, trash pickup account, etc.) or saved for future water system needs.

☐ Usually, we collect significant funds which are held in reserve for future improvements or replacement of aging system components.

☐ Usually, we are in the red. However, we do transfer funds from other activities (e.g. electrical generation, sewer fund, etc.) and this balances the water system budget.

☐ Usually, we are in the red. Thus, we intend to raise our water rates.

Division staff contact the manager or operator of each community water system (as defined by the Division of Drinking Water) to schedule a data analysis meeting. Many times operators inadvertently omit necessary information of their yearly form. During such meetings, division staff attempts to retrieve missing data as well as obtain an overall feeling of the supplies and demands of the water system, in case estimates are necessary. Additionally, a secondary objective of these meetings is to educate the operator or manager to correctly complete the water use data form. Division staff supply a new form to those systems that either didn't receive one or didn't return one. This methodology has been used since 1994, and all of the community water systems for the various basins studied have provided the necessary M&I water supply and use data.

During the analysis, division staff determines the system's water supply and use. Two factors define water supply: 1) maximum water supply available under present conditions and 2) reliable system source capacity. The maximum water supply available under present conditions is defined as the water resource which is presently developed. The resource is limited by either a mechanical constraint (such as pump capacity or pipe size), a hydrologic constraint (such as reliable streamflow or groundwater safe yield) or a legal constraint (such as a water right or contract). The lesser amount of these three constraints is considered in this study as the maximum water supply available under present conditions. Determination of well pump capacities, spring flow estimates, treatment plant capacities, and water right information aid in the calculation of this value. It should be noted here that due to the complexity of water rights, contracts, exchanges, etc., a detailed search of water right limitations associated with each entity is not in the scope of this study.

The reliable system source capacity is defined as the capacity to meet peak day demands, expressed as an annual volume. The maximum water supply available under present conditions (defined earlier) deals with an average annual volume. Many water supply components in M&I systems (treatment plants, storage facilities, pump motors, etc.) are sized using demand during a peak 24-hour period. The

relationship between average day and peak day demand is important. It is for this reason that a more reliable system source capacity is determined to accurately reflect future M&I water conditions for each system. The relationship that is used is as follows:

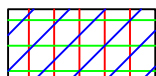
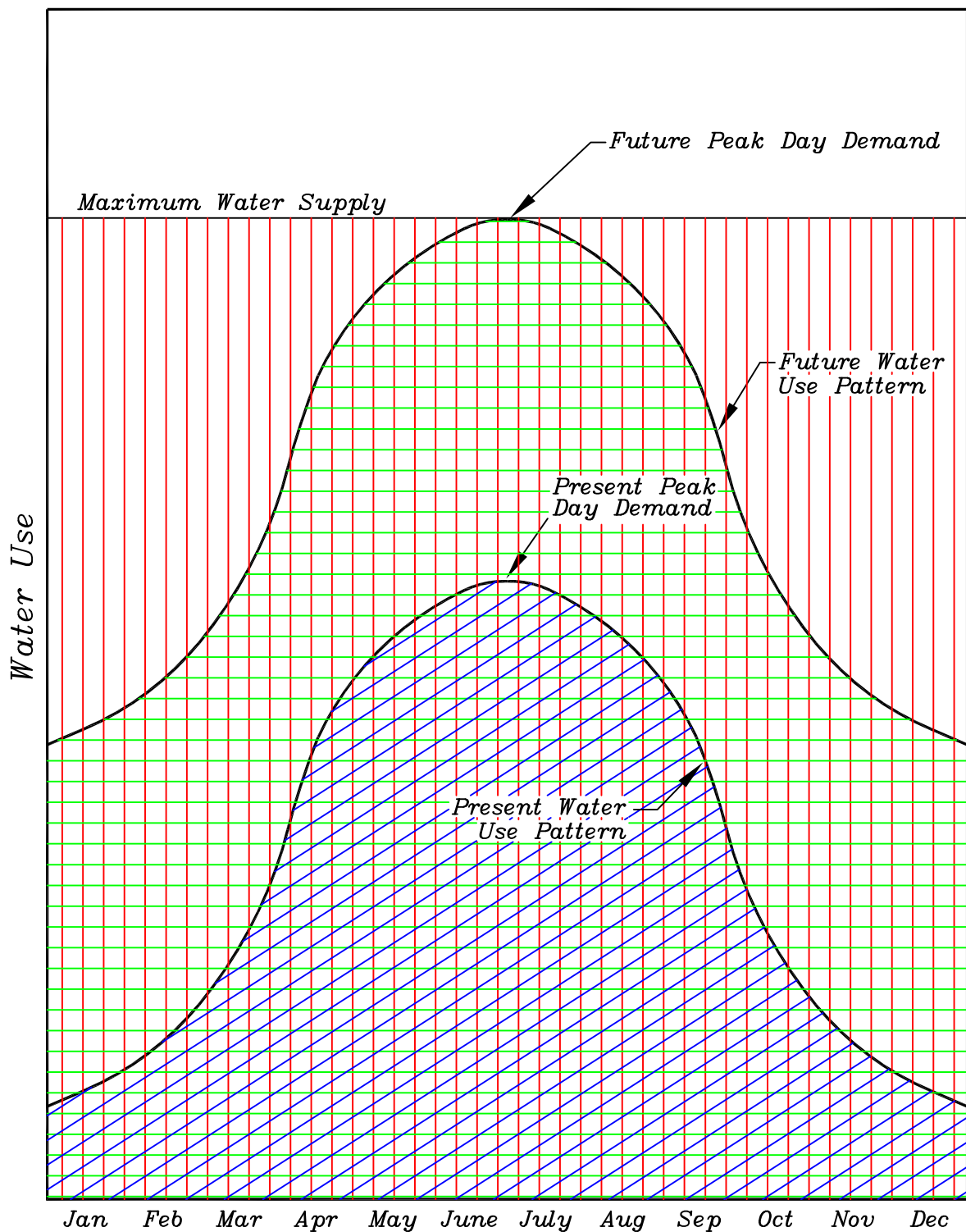
$$P_D = - 49.4 + 2.5 A_D$$

where P_D is peak day demand and A_D is average daily demand

For each public community system, the average per capita use (described later) is used in the relationship above to determine a peak factor, and the maximum water supply available under present conditions is used to determine a peak day supply. These two values are then used in calculating the reliable system source capacity which represents the systems' annual maximum water supply's ability to meet peak day demand conditions. It also represents the volume of water which, when divided by the average annual per capita water use, gives the population that can be reliably served by the present system sources.

Figure 4 graphically presents the relationship between maximum water supply and reliable system source capacity. Current water use is shown in the figure as the volume under the lower curve. The future water use is shown as the volume under the upper curve. The maximum water supply under present conditions is shown by the volume under the upper line. Because this amount is associated with a maximum daily flow rate (limited by the water right or system capacity), the line in the figure must pass through the peak day demand point on the future water use curve. It is for this reason (and the fact that most culinary water system storage tanks are designed to store only about one days' worth of water demand) that not all of the maximum water supply is available to meet future water needs. Therefore, the reliable system source capacity, which is equal to the volume under the future water use curve, is a better indication for meeting future water needs. For most systems this value is about one half of the maximum water supply.

The reliable system source capacity is valuable in determining future water capacities of the particular community water system sources (wells, springs, etc.).



Present Yearly Water Use (Volume under curve)



Present Reliable System Source Capacity/Future Water Use (Volume under curve)
When this volume is divided by annual per capita water use, this yields the population that can be reliably served.



Maximum Source Capacity Available Under Present Conditions (Volume under line)

Figure 4. Water Supply and Use Hydrograph.

Although future water projections are not addressed in this study, the data provided here are used in the state water plans which the division is formulating for each major hydrologic basin in the state. These basin plans deal with considerable detail about future water demands and supplies.

The last part of the data collection process is to determine the present water use for each community water system. Present water use, as defined herein, includes the developed water which is actually diverted into the distribution system from surface or subsurface sources. The data collected represents the latest available complete calendar year from when the study is started. Water use is divided into four categories: residential, commercial, institutional and industrial. For comparative purposes the division chose these categories to correlate with the United States Geological Survey's (USGS) categories of domestic, commercial, industrial, and mining. The division's residential category is equivalent to the USGS domestic category and includes water used in residential homes for inside and outside uses. The USGS commercial category is equivalent to the division's combined commercial and institutional categories. The commercial category includes water use for retail establishments and businesses. The institutional category includes water use for government facilities, military facilities, schools, hospitals, churches, parks, cemeteries, golf courses, etc. The division's industrial category is equivalent to the combined USGS categories of industrial and mining which includes a wide variety of water uses associated with businesses that produce a specific product.

Residential Use

From the system operator, the staff collects data about the number of residential connections and the amount of water used by those connections. Water use in this category is divided into three subcategories: culinary-outside, culinary-inside, and secondary-outside use. The first step in calculating the amount of water used in each of these subcategories is determining the amount of outside irrigation.

Because very few entities meter outside water use, division staff attempts to determine the acreage that is actually irrigated by homeowners. Average lot size, percent irrigated, percent of residences that are supplied by separate secondary (pressurized and ditch) irrigation systems, water right-duty rates in the area, and other related information are used to estimate outside water use for each entity. Occasionally, delineation between lawns or gardens and farm fields becomes difficult. In these cases, the division's land use mapping program is utilized to take out the areas of the community that have been included as irrigated farmland.

Once residential outside water use is determined, it is subtracted from the given total residential water use. This amount is assumed to be the residential inside water use. When available, indoor water use can be estimated by looking at several residences' winter water bills and meter readings. When either of these methods yield an unreasonable value, then the staff uses a general range of between 75 and 120 gallons per capita per day (gpcd) for inside use and back-calculates outside water use from the total water use given.

Commercial Use

For most systems, the system operator can separate metered commercial water use data from the total water use. In cases where this data is not available or is extremely difficult to obtain, division staff attempts to estimate commercial water use by inventorying commercial businesses in the area and using published commercial water use estimates. These publications come from the Division of Drinking Water and from reports published by the Utah State Water Lab. In some rural communities where there is a relatively small number of commercial connections, the businesses are visited by division staff and asked about their water use.

Institutional Use

Institutional water use is water used for city, county, state and federal government facilities, parks, golf courses, schools, hospitals, churches, military facilities, fire hydrant testing and other municipal losses in the water system. Because this water use is rarely metered, the process to acquire this data is a difficult one. Again, the system operator is asked to provide information about city facilities such as number and size of parks, schools, churches, and golf courses. Water right-duty rates for the area are used to calculate the amount of water these areas use. Also, estimates are made of leakage and testing of water system facilities and included in this category.

Industrial Use

Industrial use within community water systems is acquired with the same process used to obtain commercial water use data discussed earlier. Industrial water use is defined as water used in the production of a product. Therefore, such commercial establishments as dairies and mink farms are included in this category, provided a community system serves them.

Present Methodology for Non-Community Water Systems

Division staff attempts to contact each non-community system and make a personal visit. These systems rarely meter their water use, so estimates are made by division staff as to their actual annual water use. Questions are asked to determine type of facility, population served, water source information, irrigation of outside areas, etc. This data, along with other water -related publications, are used to determine water use. The maximum water supply for these systems is often not available and is not in the scope of this study.

Present Methodology for Self-Supplied Industrial Water Systems

For self-supplied industries, water use is acquired by using data given on the Division of Water Rights Industrial Water Use Form. The Division of Water Rights collects annual water use data from most of the major self-supplied industrial water users in the state. This data is confidential. Therefore, the data presented in this M&I study is only given as county totals. Again, the maximum water supply is often not available and is not in the scope of this study.

Present Methodology for Private Domestic Water Systems

Private domestic systems are residences that are not connected to any public community or non-community water system. They are usually supplied by individual wells. The water use data for this category is acquired by taking the State Office of Budget county population data and subtracting the population served by community water systems. The remainder is the population that is served by private domestic systems. A reasonable per capita rate (usually determined from the residential per capita rates from nearby community systems) is applied to this population to determine the total water use by private domestic systems. Since the maximum water supply for private wells is really an analysis of the total groundwater reservoir/recharge area, it is not in the scope of this study.

DEFINITIONS OF WATER TERMS

Some water terms peculiar to the water industry are briefly defined in order to better understand the information presented.

Water Supply Terms

Water is supplied by a variety of systems for many users. The general term supply is defined as the amount of water available. Most water supply systems are owned by a municipality, but in some cases the owner/operator is a private company or a state or federal agency. Thus, a "public" water supply may be either publicly or privately owned. Also, systems may supply treated or untreated water.

Maximum Water Supply Available Under Present Conditions - The annual volume of water which is the lesser of the hydrologic capacity of the water source, the physical capacity of the water system, or the use allowed by the water right. See Figure 4.

Reliable System Source Capacity - The actual annual quantity of the maximum water supply that is available to meet peak demands. When this number is divided by the average per capita usage, the resulting number represents the maximum population that the water source can serve. See Figure 4.

Municipal Water Supply - A supply that provides potable (culinary) water for residential, commercial, and institutional uses. The terms municipal, community and city are often used interchangeably.

Municipal and Industrial Water Supply - Includes all water (potable and non-potable) supplied for residential, commercial, institutional, light industry, and large self-supplied industries. This supply is available for public community systems, public

non-community (transient and non-transient) system, self-supplied industrial systems, unregulated Indian systems and private wells.

Potable Water Supply - Water meeting all applicable safe drinking water requirements for residential, commercial, institutional and industrial uses. Sometimes referred to as culinary water supply.

Non -Potable Water Supply - Water not meeting safe drinking water requirements. Secondary irrigation companies and self-supplied industries supply this water. Sometimes referred to as non-culinary water supply, but usually referred to as secondary water.

Public Community Water Supply - Includes potable water supplied by either privately or publicly owned community systems which serve at least 15 service connections or 25 individuals occupied year round. Water from public community supplies may be used for residential, commercial, institutional, and industrial purposes. This can include both indoor and outdoor uses.

Public Non-Community Water Supply - Includes potable water supplied by either privately or publicly owned systems of two types; transient and non-transient. Transient systems are systems that do not serve 25 of the same non-resident persons per day for more than six months per year. Examples include campgrounds, RV parks, restaurants, convenience stores, etc. Non-transient systems are systems that regularly serve 25 of the same non-resident persons per day for more than six months per year. Examples include churches, schools and industries. This report combines transient and non-transient systems together and calls them all public non-community systems. Industries are reported under self-supplied industries.

Secondary Water Supply - Pressurized or open ditch water supply systems that supply untreated water for irrigation of privately and publicly owned lawns, gardens, parks, cemeteries, golf courses and other open areas. These systems, sometimes called "dual" water systems, are installed to provide an alternative to irrigating with culinary water for these outdoor areas. This supply is often provided by irrigation companies. Self-supplied industries can also use secondary water for industrial processes.

Self-supplied Industrial Supply - Includes potable or non-potable water supplied by individual privately owned industries usually from their own wells or springs.

Water Use Terms

Water is used in a variety of ways and for many purposes. Water is often said to be "used" when it is diverted, demanded, withdrawn, depleted or consumed. But it is also "used" in place for such things as fish and wildlife habitat, recreation and hydropower production. The word *use* can be inserted where the word *supply* is written in most of the previous water supply terms to define the current demand associated with those definitions. Some additional water use terms are as follows:

Commercial Use - Uses normally associated with small business operations which may include drinking water, food preparation, personal sanitation, facility cleaning and maintenance and irrigation of facility landscapes. Retail businesses, restaurants and hotels are some examples.

Industrial Use - Uses associated with the manufacturing or production of products. The volume of water used by industrial businesses can be considerably greater than water used by commercial businesses. Manufacturing plants, oil and gas producers, mining companies, milk farms and dairies are some examples.

Institutional Use - Uses normally associated with general operation of various public agencies and institutions including drinking water, personal sanitation, facility cleaning and maintenance and irrigation of parks, cemeteries, playgrounds, recreational areas, golf courses, and other facilities. Many times the amount used by cities for outside irrigation of public areas is not metered.

Municipal and Industrial (M&I) Use - Term includes all residential, commercial, institutional, and industrial uses. It includes total uses (potable and non-potable) supplied by public water systems (community and non-community), self-supplied industries, private domestic systems, and secondary irrigation companies.

Private-Domestic Use - Includes water from private wells or springs for use in individual homes, usually in rural areas not accessible to public water supply systems.

Residential Use - Water use associated with residential cooking; drinking water; washing clothes; miscellaneous cleaning; personal grooming and sanitation; irrigation of lawns, gardens and landscapes, and washing automobiles, driveways and other outside facilities. Single family homes, apartments, duplexes and condominiums are some examples.

Other Water Terms

Consumption - Water evaporated, transpired or irreversibly bound in either a physical, chemical or biological process.

Consumptive Use - Losses of water brought about by human endeavors when used for residential, commercial, institutional, industrial, agricultural, power generation, and recreation. Naturally occurring vegetation and fish and wildlife also consumptively use water.

Depletion - Water lost or made unavailable for return to a given designated area, river system or basin. It is intended to represent the net loss to a system. The terms consumption and depletion are often used interchangeably but are not the same. For example, water exported from a basin is depletion to the basin system but is not consumed in the basin. The exported water is available for use in another system. Water diverted to irrigated crops in a given system, but not returned for later use, is depletion. Precipitation that falls on irrigated crops is not considered a part of the supply like surface water and groundwater diversions. For this reason, precipitation falling on and consumed by irrigated crops is not considered as being a depletion to the system.

Diversion - Water diverted from supply sources such as streams, lakes, reservoirs or groundwater for a variety of uses including cropland irrigation, residential, commercial, institutional and industrial. The terms diversion and withdrawal are often used interchangeably.

Withdrawal - Water withdrawn from supply sources such as lakes, streams, reservoirs or groundwater. This term is normally used in association with groundwater withdrawal.

WATER RIGHTS IN THE UINTAH BASIN

Although a detailed analysis of water rights is not part of this report, a water supply and use study would not be complete without a discussion on the current water right regulations in the area. The following discussion was obtained from the Division of Water Rights, Vernal area office. It explains the current general water right regulations in the Uintah Basin with regards to M&I uses.

Daggett, Duchesne and Uintah Counties

Surface water is fully appropriated except for isolated springs. In areas outside of public water system boundaries isolated springs and groundwater applications are limited to inside uses for one family with one acre of irrigation and 10 head of stock. Areas above the confluence of the Strawberry and Duchesne Rivers are limited to inside uses for one family with .25 acre irrigation and 10 head of stock.

Wasatch County

Surface water is fully appropriated. In areas outside of public system boundaries groundwater applications are limited to inside uses for one family.

DAGGETT COUNTY M&I WATER SUPPLIES AND USES

Daggett County includes the incorporated communities of Dutch John and Manila. Within this area are 5 public community systems and 9 public non-community systems. Location of public community systems are shown in figure 3.

Table 1 shows that the maximum annual water supply for public community systems in this portion of Daggett County is 1,478 acre-feet; 227 acre-feet from springs, 429 acre-feet from wells and 822 from Flaming Gorge Reservoir. Reliable system source capacity is less than half that amount at 627 acre-feet.

TABLE 1
DAGGETT COUNTY
Potable Water Supplies for Public Community Systems

WATER SUPPLIER	Springs (Ac-Ft/Yr)	Wells (Ac-Ft/Yr)	Surface (Ac-Ft/Yr)	Total (Ac-Ft/Yr)
DAGGETT COUNTY				
Bureau of Reclamation (Dutch John)	0.0	0.0	500.0	500.0
Dagget County Water & Sewer	48.0	169.0	0.0	217.0
Greendale Water Company	116.0	0.0	0.0	116.0
Manila Municipal Water System	60.0	241.0	322.0	623.0
Questar Pipeline Company (Clay Basin)	3.0	19.3	0.0	22.3
DAGGETT COUNTY TOTALS	227.0	429.3	822.0	1,478.3

Note: All values represent maximum system source capacities limited by water rights, hydrologic constraints, and/or system constraints.

Table 2 shows the reliable system source capacity along with a breakdown of potable water use for each public community system. This table shows that for Daggett County the current annual use of 506 acre-feet is about 80 percent the reliable supply of 627 acre-feet.

Secondary water is another important aspect of total M&I use. Table 3 gives the amount of secondary water used for various categories within the boundaries of the public community systems. In Daggett County various irrigation companies deliver secondary water to customers. Total secondary use is 56 acre-feet.

**TABLE 2
DAGGETT COUNTY
WATER USE AND SUPPLY FOR PUBLIC COMMUNITY SYSTEMS**

WATER SUPPLIER	POTABLE USAGE						POTABLE PER CAPITA USAGE			MAXIMUM WATER SUPPLY AVAILABLE UNDER PRESENT CONDITIONS (Ac-Ft/Yr)	POTABLE ESTIMATED PEAK DAY VALUES				RELIABLE SYSTEM SOURCE CAPACITY UNDER PRESENT CONDITIONS (Ac-Ft/Yr)
	Residential Indoor Use (Ac-Ft/Yr)	Residential Outdoor Use (Ac-Ft/Yr)	Commercial Indoor and Outdoor Use (Ac-Ft/Yr)	Institutional Indoor and Outdoor Use (Ac-Ft/Yr)	Industrial/ Stockwater Indoor and Outdoor Use (Ac-Ft/Yr)	Total Potable M & I Use (Ac-Ft/Yr)	Population	Average Per Capita Water Use (Ac-Ft/Yr)	Average Per Capita Water Use (GPCPD)		Assumed Peaking Factor (PD/AD)	Peak Day Supply (MGD)	Peak Day Demand (MGD)	Peak Day Supply Over Demand (MGD)	
DAGGETT COUNTY															
Bureau of Reclamation (Dutch John)	13.5	43.4	0.0	59.2	0.0	116.1	180	0.645	575.8	500	2.4142	0.4463	0.2502	0.1961	207.1
Dagget County Water & Sewer	36.9	31.1	1.3	0.0	12.6	81.9	250	0.328	292.4	217	2.3311	0.1937	0.1704	0.0233	93.1
Greendale Water Company	30.8	0.4	20.8	0.0	0.0	52.0	125	0.416	371.4	116	2.3670	0.1099	0.1099 *	0.0000	52.0
Manila Municipal Water System	89.7	126.4	10.9	21.4	0.0	248.4	660	0.376	336.0	623	2.3530	0.5561	0.5218	0.0344	264.8
Questar Pipeline Company (Clay Basin)	1.8	5.2	0.0	0.0	0.7	7.7	21	0.367	327.3	22	2.3491	0.0199	0.0161	0.0038	9.5
										see note					
DAGGETT COUNTY TOTALS	172.7	206.5	33.0	80.6	13.3	506.1	1,236	0.409	365.5	1,478	2.3649	1.3260	1.0684	0.2576	626.5
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P

* Note: Peak Day Demand exceeds the calculated Peak Day Supply. An assumption was made that in these cases the Peak Day Supply has been exactly met and should be set equal to the Peak Day Demand.

Although some systems may withdraw the maximum water supply available under present conditions, the hydrologic conditions will probably limit all systems collectively from withdrawing this quantity, as presented.

A, B, C, D, E, F, H, and K

G=B+C+D+E+F

I=G/H

J=I*892.682

L=(2.5*J-49.4)/J

M=K*892.682/1000000; (except as provided in the note above)

N=H*J*L/1000000

O=M-N

P={M/(L*J)}*J*1120.22

These values are all input data.

This value represents only Potable M&I Water Use.

Average per capita potable water use.

Converts from Ac-Ft/Yr to GPD

The factor which when multiplied to the average per capita water use represents water use during peak demands.

Peak Day Supply of potable water based on maximum reliable source capacity converted to MGD). Where the calculated Peak Day Supply of potable water is less than the Peak Day Demand of Potable Water, this value was set equal to the Peak Day Demand of potable water.

Peak Day Demand on potable water based on the total potable M&I water use multiplied by the peaking factor

The amount of Peak Day Supply of potable water above the amount of the Peak Day Demand of potable water.

Reliable system source capacity represents that volume of water, which when divided by the average annual water per capita use, gives that population that can be reliably served by the system sources under peak day demand conditions.

TABLE 3
DAGGETT COUNTY
Secondary (Non-Potable) Water Use Within Public Community Systems

WATER SUPPLIER	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial/ Stockwater Use (Ac-Ft/Yr)	Total Secondary Use (Ac-Ft/Yr)
DAGGETT COUNTY					
Bureau of Reclamation (Dutch John)	0.0	0.0	0.0	0.0	0.0
Dagget County Water & Sewer	1.0	0.0	0.0	0.0	1.0
Greendale Water Company	0.0	10.0	0.0	0.0	10.0
Manila Municipal Water System	9.0	0.0	35.3	0.3	44.6
Questar Pipeline Company (Clay Basin)	0.0	0.0	0.0	0.0	0.0
DAGGETT COUNTY TOTALS	10.0	10.0	35.3	0.3	55.6

Note: Separate irrigation companies provide secondary water to the water supplier unless indicated by an "†".

Table 4 gives water use for public non-community system and private domestic systems. Flaming Gorge National Recreation Area contains 6 of these non-community systems. There are no self-supplied industries and only a few private domestic wells. All of these uses amount to 36 acre-feet.

TABLE 4
DAGGETT COUNTY
**Water Use for Public Non-Community Systems,
Self-Supplied Industries and Private Domestic Systems**

Non-Community System	POTABLE USAGE					SECONDARY USE (Ac-Ft/Yr)
	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial/ Stockwater Use (Ac-Ft/Yr)	Total Potable Use (Ac-Ft/Yr)	
DAGGETT COUNTY						
Flaming Gorge N. R. A. Systems						
Antelope Flat Campground	0.0	0.0	1.8	0.0	1.8	0.0
Greendale and Bootleg Campgrounds	0.0	0.0	1.2	0.0	1.2	0.0
Hideout Canyon Campground	0.0	0.0	0.4	0.0	0.4	0.0
Little Hole Boat Ramp	0.0	0.0	0.6	0.0	0.6	0.0
Lucerne Valley Campground & Marina	0.0	0.0	8.1	0.0	8.1	0.0
Ross Springs Water System	1.0	2.6	2.8	0.0	6.4	0.0
Forest Service Systems						
Red Springs/Lodgepole Campgrounds	0.0	0.0	2.4	0.0	2.4	0.0
BLM Systems						
Bridge Hollow Campground	0.0	0.0	0.1	0.0	0.1	0.0
Jarvie Historical Site	0.0	0.0	0.1	0.0	0.1	0.0
SELF SUPPLIED INDUSTRIES	0.0	0.0	0.0	0.0	0.0	0.0
PRIVATE DOMESTIC SYSTEMS	15.0	0.0	0.0	0.0	15.0	0.0
DAGGETT COUNTY TOTALS	16.0	2.6	17.5	0.0	36.1	0.0

Total potable M&I water use in the county is 542 acre-feet, while secondary use is 56 acre-feet; giving a total M&I water use of 598 acre-feet. Since the current population of Daggett County is about 800 the total M&I per capita use is 666 gpcd. Table 5 gives various per capita rates for public community systems. Appendix A shows the data for each public community system that is presented in the tables.

TABLE 5
DAGGETT COUNTY
Average Per Capita M&I Water Use for all Public Community Systems

CATEGORY	Average Per Capita Use (Ac-Ft/Yr)	Average Per Capita Use (GPCD)
Residential Potable Use	0.307	274
Residential Potable Plus Secondary Use	0.315	281
Total Potable Use	0.409	366
Total Potable Plus Secondary Use	0.454	406

Note: Total Potable categories include residential, commercial, institutional and industrial uses.

DUCHESNE COUNTY M&I WATER SUPPLIES AND USES

Duchesne County includes the incorporated communities of Duchesne, Fruitland, Myton, Neola, Roosevelt and Tabiona. Within this area are 10 public community systems, 15 public non-community systems, and 1 self-supplied industry. Location of the public community systems are shown back in figure 3. Central Utah Water Conservancy District wholesales water to Duchesne Water System and East Duchesne Improvement District from Starvation Reservoir. Duchesne in turn delivers water to Myton and Johnson Water District.

Table 6 shows that the maximum annual water supply for public community systems in Duchesne County is 14,533 acre-feet; 5,370 acre-feet from springs and 8,379 acre-feet from wells and 784 acre-feet from Starvation Reservoir. Reliable system source capacity is less than half that amount at 6,581 acre-feet.

TABLE 6
DUCHESNE COUNTY
Potable Water Supplies for Public Community Systems

WATER SUPPLIER	Springs (Ac-Ft/Yr)	Wells (Ac-Ft/Yr)	Surface (Ac-Ft/Yr)	Total (Ac-Ft/Yr)
DUCHESNE COUNTY				
Central Utah Water Conservancy District				
Duchesne Water System	3,898.0	0.0	0.0	3,898.0
Myton Municipal Water System	0.0	0.0	150.0	150.0
Johnson Water District	0.0	2,161.0	52.0	2,213.0
East Duchesne Improvement District	0.0	0.0	582.5	582.5
Duchesne County Upper Country WID	1,128.7	0.0	0.0	1,128.7
Fruitland Water Special Service District	150.0	0.0	0.0	150.0
Roosevelt Municipal Water Systems	0.0	5,500.0	0.0	5,500.0
Neola Water District	0.0	153.4	0.0	153.4
Tabiona Water System	193.0	0.0	0.0	193.0
Valley Park Trailer Court	0.0	564.4	0.0	564.4
DUCHESNE COUNTY TOTALS	5,369.7	8,378.8	784.5	14,533.0

Note: All values represent maximum system source capacities limited by water rights, hydrologic constraints, and/or system constraints.

Table 7 shows the reliable system source capacity along with a breakdown of the potable water use for each public community system. This table shows that for

**TABLE 7
DUCHESNE COUNTY
WATER USE AND SUPPLY FOR PUBLIC COMMUNITY SYSTEMS**

WATER SUPPLIER	POTABLE USAGE						POTABLE PER CAPITA USAGE			MAXIMUM WATER SUPPLY AVAILABLE UNDER PRESENT CONDITIONS (Ac-Ft/Yr)	POTABLE ESTIMATED PEAK DAY VALUES				RELIABLE SYSTEM SOURCE CAPACITY UNDER PRESENT CONDITIONS (Ac-Ft/Yr)
	Residential Indoor Use (Ac-Ft/Yr)	Residential Outdoor Use (Ac-Ft/Yr)	Commercial Indoor and Outdoor Use (Ac-Ft/Yr)	Institutional Indoor and Outdoor Use (Ac-Ft/Yr)	Industrial/ Stockwater Indoor and Outdoor Use (Ac-Ft/Yr)	Total Potable M & I Use (Ac-Ft/Yr)	Population	Average Per Capita Water Use (Ac-Ft/Yr)	Average Per Capita Water Use (GPCPD)		Assumed Peaking Factor (PD/AD)	Peak Day Supply (MGD)	Peak Day Demand (MGD)	Peak Day Supply Over Demand (MGD)	
DUCHESNE COUNTY															
Central Utah Water Conservancy District															
Duchesne Water System	171.9	14.4	30.1	56.2	1.4	274.0	1,850	0.148	132.2	3,898.0	2.1264	3.4797	0.5201	2.9596	1833.2
Myton Municipal Water System	47.6	28.1	9.1	21.2	0.0	106.0	520	0.204	182.0	150.0	2.2285	0.2109	0.2109	*	0.0000
Johnson Water District	291.7	7.0	5.5	1.1	507.9	813.2	1,600	0.508	453.7	2,213.0	2.3911	1.9755	1.7358	0.2397	925.5
East Duchesne Improvement District	60.8	0.0	1.9	4.2	29.5	96.4	520	0.185	165.5	582.5	2.2015	0.5200	0.1894	0.3305	264.6
Duchesne County Upper Country WID	95.8	6.6	12.7	16.4	20.1	151.6	1,400	0.108	96.7	1,128.7	1.9890	1.0076	0.2692	0.7384	567.5
Fruitland Water Special Service District	27.5	1.2	0.8	0.9	1.7	32.1	207	0.155	138.4	150.0	2.1431	0.1339	0.0614	0.0725	70.0
Roosevelt Municipal Water Systems	431.6	320.3	135.7	176.9	124.8	1,189.3	4,500	0.264	235.9	5,500.0	2.2906	4.9098	2.4319	2.4779	2401.1
Neola Water District	73.9	0.0	0.1	6.5	0.0	80.5	500	0.161	143.7	153.4	2.1563	0.1550	0.1550	*	0.0000
Tabiona Water System	17.1	41.0	0.6	0.6	2.7	62.0	125	0.496	442.8	193.0	2.3884	0.1723	0.1322	0.0401	80.8
Valley Park Trailer Court	6.7	6.0	0.0	0.0	0.0	12.7	60	0.212	189.0	564.4	2.2386	0.5038	0.0254	0.4785	252.1
										see note					
DUCHESNE COUNTY TOTALS	1,224.6	424.6	196.5	284.0	688.1	2,817.8	11,282	0.250	223.0	14,533	2.2784	13.0683	5.7312	7.3372	6581.3
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P

* Note: Peak Day Demand exceeds the calculated Peak Day Supply. An assumption was made that in these cases the Peak Day Supply has been exactly met and should be set equal to the Peak Day Demand.
Although some systems may withdraw the maximum water supply available under present conditions, the hydrologic conditions will probably limit all systems collectively from withdrawing this quantity, as presented.

A, B, C, D, E, F, H, and K

G=B+C+D+E+F

I=G/H

J=I*892.682

L=(2.5*J-49.4)/J

M=K*892.682/1000000; (except as provided in the note above)

N=H*J*L/1000000

O=M-N

P=(M/(L*J))*J*1120.22

These values are all input data.

This value represents only Potable M&I Water Use.

Average per capita potable water use.

Converts from Ac-Ft/Yr to GPD

The factor which when multiplied to the average per capita water use represents water use during peak demands.

Peak Day Supply of potable water based on maximum reliable source capacity converted to MGD). Where the calculated Peak Day Supply of potable water is less than the Peak Day Demand of Potable Water, this value was set equal to the Peak Day Demand of potable water.

Peak Day Demand on potable water based on the total potable M&I water use multiplied by the peaking factor

The amount of Peak Day Supply of potable water above the amount of the Peak Day Demand of potable water.

Reliable system source capacity represents that volume of water, which when divided by the average annual water per capita use, gives that population that can be reliably served by the system sources under peak day demand conditions.

Duchesne County the current annual potable use of 2,818 acre-feet is a little less than one half the reliable system source capacity of 6,581 acre-feet.

Secondary water is another important aspect of total M&I use. Table 8 gives the annual amount of secondary water used for various categories within the boundaries of the public community systems. In Duchesne County, various irrigation companies deliver secondary water to customers. Total secondary use is 950 acre-feet.

TABLE 8
DUCHESNE COUNTY
Secondary (Non-Potable) Water Use Within Public Community Systems

WATER SUPPLIER	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial/ Stockwater Use (Ac-Ft/Yr)	Total Secondary Use (Ac-Ft/Yr)
DUCHESNE COUNTY					
Central Utah Water Conservancy District					
Duchesne Water System	103.7	0.0	1.0	0.0	104.7
Myton Municipal Water System	5.3	0.0	0.0	0.0	5.3
Johnson Water District	106.0	0.0	0.0	0.0	106.0
East Duchesne Improvement District	45.0	0.0	12.0	0.0	57.0
Duchesne County Upper Country WID	105.6	0.0	133.2	0.0	238.8
Fruitland Water Special Service District	0.0	0.0	0.0	0.0	0.0
Roosevelt Municipal Water Systems	0.0	0.0	326.1	0.0	326.1
Neola Water District	54.0	0.0	21.0	0.0	75.0
Tabiona Water System	24.9	0.0	12.0	0.0	36.9
Valley Park Trailer Court	0.0	0.0	0.0	0.0	0.0
DUCHESNE COUNTY TOTALS	444.5	0.0	505.3	0.0	949.8

Note: Separate irrigation companies provide secondary water to the water supplier unless indicated by an *.

Table 9 gives annual water use for public non-community systems, self-supplied industries, and private domestic systems. Starvation Reservoir State Park are among the 15 listed non-community systems. Target Trucking, Inc. is the one listed self-supplied industry. There are several residences that use their own wells. All of these uses amount to 620 acre-feet of potable and 36 acre-feet of non-potable water.

Total potable M&I water use in the county is 3,438 acre-feet, while secondary use is 986 acre-feet; giving a total M&I water use of 4,424 acre-feet. Since the current population of Duchesne County is about 14,000 the total M&I per capita use

is 282 gpcd. Table 10 gives various per capita rates for public community systems. Appendix B shows the data for each public community system that is presented in the tables.

TABLE 9
DUCHESNE COUNTY
Water Use for Public Non-Community Systems,
Self-Supplied Industries and Private Domestic Systems

Non-Community System	POTABLE USAGE					SECONDARY USE (Ac-Ft/Yr)
	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial/ Stockwater Use (Ac-Ft/Yr)	Total Potable Use (Ac-Ft/Yr)	
DUCHESNE COUNTY						
Forest Service Systems						
Aspen Grove Campground	0.0	0.0	0.2	0.0	0.2	0.0
Butterfly Campground & Highline Trailhead	0.0	0.0	0.1	0.0	0.1	0.0
Hades Campground	0.0	0.0	0.1	0.0	0.1	0.0
Iron Mine Campground	0.0	0.0	0.2	0.0	0.2	0.0
Mirror Lake Campground	0.0	0.0	1.9	0.0	1.9	0.0
Moon Lake Campground	0.0	0.6	0.7	0.0	1.3	0.0
Moosehorn Campground	0.0	0.0	0.2	0.0	0.2	0.0
Upper Stillwater Campground	0.0	0.6	0.5	0.0	1.1	12.0
Yellowpine Campground	0.0	0.0	1.0	0.0	1.0	0.0
State Park Systems						
Starvation Reservoir State Park	0.3	0.0	4.9	0.0	5.2	0.0
Camelot Resort	0.1	0.0	1.4	0.0	1.5	24.0
Camp Timberlane	0.0	0.0	0.2	0.0	0.2	0.0
Defas Dude Ranch	0.0	2.9	0.0	0.0	2.9	0.0
Granita Park	1.0	0.2	0.0	0.0	1.2	0.0
Mount Tabby Improvement Group	4.9	0.0	0.0	0.0	4.9	0.0
SELF SUPPLIED INDUSTRIES*	0.0	0.0	0.0	37.8	37.8	0.0
PRIVATE DOMESTIC SYSTEMS	560.0	0.0	0.0	0.0	560.0	0.0
DUCHESNE COUNTY TOTALS	566.3	4.3	11.4	37.8	619.8	36.0

*SELF SUPPLIED INDUSTRIES: Target Trucking, Inc.

TABLE 10
DUCHESNE COUNTY
Average Per Capita M&I Water Use for all Public Community Systems

CATEGORY	Average Per Capita Use (Ac-Ft/Yr)	Average Per Capita Use (GPCD)
Residential Potable Use	0.146	131
Residential Potable Plus Secondary Use	0.186	166
Total Potable Use	0.250	223
Total Potable Plus Secondary Use	0.334	298

Note: Total Potable categories include residential, commercial, institutional and industrial uses.

SUMMIT COUNTY M&I WATER SUPPLIES AND USES

The Uintah Basin portion of Summit County includes no incorporated communities. Within this area are 4 public non-community systems. Table 11 shows the water use for public non-community systems. There are no self-supplied industries and no private domestic wells. All of these uses amount to 3 acre-feet.

TABLE 11
SUMMIT COUNTY
Water Use for Public Non-Community Systems,
Self-Supplied Industries and Private Domestic Systems

Non-Community System	POTABLE USAGE					SECONDARY USE (Ac-Ft/Yr)
	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial/ Stockwater Use (Ac-Ft/Yr)	Total Potable Use (Ac-Ft/Yr)	
SUMMIT COUNTY						
<i>Forest Service Systems</i>						
<i>Bridger Lake Campground</i>	0.0	0.0	0.7	0.0	0.7	0.0
<i>Hoop Lake Campground</i>	0.0	0.0	0.2	0.0	0.2	0.0
<i>Little Lyman Lake Campground</i>	0.0	0.0	1.1	0.0	1.1	0.0
<i>Spirit Lake Lodge</i>	0.0	1.0	0.0	0.0	1.0	0.0
SELF SUPPLIED INDUSTRIES	0.0	0.0	0.0	0.0	0.0	0.0
PRIVATE DOMESTIC SYSTEMS	0.0	0.0	0.0	0.0	0.0	0.0
SUMMIT COUNTY TOTALS	0.0	1.0	2.0	0.0	3.0	0.0

UINTAH COUNTY M&I WATER SUPPLIES AND USES

Uintah County includes the incorporated communities of Ballard, Jensen, Maeser, Vernal and Tridell-LaPoint. Within this area are 6 public community systems, 1 unregulated Indian system, 8 public non-community systems, and 8 self-supplied industries. Location of public community systems are shown in figure 3. The Central Utah WCD wholesales water to Vernal from Steinaker Reservoir. Ashley Valley Water and Sewer ID sells water to Jensen and Maeser from it's Ashley Creek treatment plant. The Ute Indian Tribe Water System delivers water to the Ute Indian Reservation through 3 separate unregulated water systems.

Table 12 shows that the maximum annual water supply for public community systems in Uintah County is 23,720 acre-feet; 4,135 acre-feet from springs, 20 acre-feet from wells, and 19,565 acre-feet from surface treatment plants on Ashley Creek and Steinaker Reservoir. Reliable system source capacity is slightly more than half that amount at 10,925 acre-feet.

TABLE 12
UINTAH COUNTY
Potable Water Supplies for Public Community Systems

WATER SUPPLIER	Springs (Ac-Ft/Yr)	Wells (Ac-Ft/Yr)	Surface (Ac-Ft/Yr)	Total (Ac-Ft/Yr)
UINTA COUNTY				
Ashley Valley Water & Sewer Impr. District	1,566.0	0.0	500.0	2,066.0
Jensen Water Improvement District	NA	NA	NA	NA
Maeser Water Improvement District	NA	NA	NA	NA
Central Utah Water Conservancy District				
Vernal Municipal Water System	0.0	0.0	17,922.0	17,922.0
Tridell-Lapoint Water Improvement District	0.0	0.0	1,142.5	1,142.5
Ute Indian Tribe Water System	2,419.0	20.0	0.0	2,439.0
Ballard Water Improvement District	NA	NA	NA	NA
Ouray Park Water Improvment District	150.0	0.0	0.0	150.0
UINTA COUNTY TOTALS	4,135.0	20.0	19,564.5	23,719.5

Note: All values represent maximum system source capacities limited by water rights, hydrologic constraints, and/or system constraints.

Table 13 shows the reliable system source capacity along with a breakdown of the potable water use by public community systems. This table shows that for

**TABLE 13
UINTA COUNTY
WATER USE AND SUPPLY FOR PUBLIC COMMUNITY SYSTEMS**

WATER SUPPLIER	POTABLE USAGE						POTABLE PER CAPITA USAGE			MAXIMUM WATER SUPPLY AVAILABLE UNDER PRESENT CONDITIONS (Ac-Ft/Yr)	POTABLE ESTIMATED PEAK DAY VALUES				RELIABLE SYSTEM SOURCE CAPACITY UNDER PRESENT CONDITIONS (Ac-Ft/Yr)
	Residential Indoor Use (Ac-Ft/Yr)	Residential Outdoor Use (Ac-Ft/Yr)	Commercial Indoor and Outdoor Use (Ac-Ft/Yr)	Institutional Indoor and Outdoor Use (Ac-Ft/Yr)	Industrial/ Stockwater Indoor and Outdoor Use (Ac-Ft/Yr)	Total Potable M & I Use (Ac-Ft/Yr)	Population	Average Per Capita Water Use (Ac-Ft/Yr)	Average Per Capita Water Use (GPCPD)		Assumed Peaking Factor (PD/AD)	Peak Day Supply (MGD)	Peak Day Demand (MGD)	Peak Day Supply Over Demand (MGD)	
UINTA COUNTY															
Ashley Valley Water & Sewer Impr. District	656.1	525.4	187.6	91.3	199.5	1,659.9	7,300	0.227	203.0	2,066	2.2566	3.3438	3.3438	*	1659.9
Jensen Water Improvement District	105.5	53.4	10.1	1.7	0.0	170.7	1,000	0.171	152.4	NA	NA	NA	NA	NA	NA
Maeser Water Improvement District	253.2	115.2	12.0	32.2	28.5	441.1	3,060	0.144	128.7	NA	NA	NA	NA	NA	NA
Central Utah Water Conservancy District															
Vernal Municipal Water System	612.6	623.0	367.6	683.5	0.0	2,286.7	6,700	0.341	304.7	17,922	2.3379	15.9986	4.7723	11.2264	7666.0
Tridell-Lapoint Water Improvement District	67.5	227.5	11.5	33.5	96.1	436.1	750	0.581	519.1	1,143	2.4048	1.0199	0.9362	0.0837	475.1
Ute Indian Tribe Water System	392.0	602.0	6.0	0.0	0.0	1,000.0	3,500	0.286	255.1	2,439	2.3063	2.1773	2.0588	0.1184	1057.5
Ballard Water Improvement District	73.1	76.2	57.3	7.8	0.6	215.0	700	0.307	274.2	NA	NA	NA	NA	NA	NA
Ouray Park Water Improvement District	56.0	0.0	0.0	0.0	0.2	56.2	250	0.225	200.7	150	2.2538	0.1339	0.1131	0.0208	66.6
										see note					
UINTA COUNTY TOTALS	2,216.0	2,222.7	652.1	850.0	324.9	6,265.7	23,260	0.269	240.5	23,720	2.2946	22.6735	11.2241	11.4494	10925.1
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P

* Note: Peak Day Demand exceeds the calculated Peak Day Supply. An assumption was made that in these cases the Peak Day Supply has been exactly met and should be set equal to the Peak Day Demand.
Although some systems may withdraw the maximum water supply available under present conditions, the hydrologic conditions will probably limit all systems collectively from withdrawing this quantity, as presented.

A, B, C, D, E, F, H, and K

G=B+C+D+E+F

I=G/H

J=I*892.682

L=(2.5*J-49.4)/J

M=K*892.682/1000000; (except as provided in the note above)

N=H*J*L/1000000

O=M-N

P=[M/(L*J)]*J*1120.22

These values are all input data.

This value represents only Potable M&I Water Use.

Average per capita potable water use.

Converts from Ac-Ft/Yr to GPD

The factor which when multiplied to the average per capita water use represents water use during peak demands.

Peak Day Supply of potable water based on maximum reliable source capacity converted to MGD). Where the calculated Peak Day Supply of potable water is less than the Peak Day Demand of Potable Water, this value was set equal to the Peak Day Demand of potable water.

Peak Day Demand on potable water based on the total potable M&I water use multiplied by the peaking factor

The amount of Peak Day Supply of potable water above the amount of the Peak Day Demand of potable water.

Reliable system source capacity represents that volume of water, which when divided by the average annual water per capita use, gives that population that can be reliably served by the system sources under peak day demand conditions.

Uintah County the current annual potable use of 6,266 acre-feet is a little more than half the reliable supply of 10,925 acre-feet.

Secondary water is another important aspect of total M&I use. Table 14 gives the amount of secondary water used for various categories within the boundaries of the public community systems. In Uintah County various irrigation companies deliver secondary water to all systems. Total secondary water use is 1,624 acre-feet.

TABLE 14
UINTAH COUNTY
Secondary (Non-Potable) Water Use Within Public Community Systems

WATER SUPPLIER	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial/ Stockwater Use (Ac-Ft/Yr)	Total Secondary Use (Ac-Ft/Yr)
UINTAH COUNTY					
Ashley Valley Water & Sewer Impr. District	350.3	0.0	301.0	0.0	651.3
Jensen Water Improvement District	13.4	0.0	16.0	0.0	29.4
Maeser Water Improvement District	268.8	0.0	0.0	0.0	268.8
Central Utah Water Conservancy District					
Vernal Municipal Water System	207.7	0.0	241.3	0.0	449.0
Tridell-Lapoint Water Improvement District	75.8	0.0	0.0	0.0	75.8
Ute Indian Tribe Water System	0.0	0.0	0.0	0.0	0.0
Ballard Water Improvement District	114.3	0.0	0.0	0.0	114.3
Ouray Park Water Improvment District	34.9	0.0	0.0	0.0	34.9
UINTAH COUNTY TOTALS	1,065.2	0.0	558.3	0.0	1,623.5

Note: Separate irrigation companies provide secondary water to the water supplier unless indicated by an **.

Table 15 gives water use for public non-community systems, self-supplied industries, and private domestic systems. Dinosaur Nation Monument, Red Fleet State Park and Steinaker State Park are among the 8 listed non-community systems. American Gilsonite Co., Chevron USA, Inc., CNG Producing, Inc., Deseret Generation, Flying J, Inc., Gerrity Oil Co., SF Phosphates Limited, Inc. and Wembco, Inc. are the listed self-supplied industries. There are numerous residences using their own wells. All of these uses amount to 4,452 acre-feet of potable and 7,009 acre-feet of non-potable water.

TABLE 15
UINTAH COUNTY
Water Use for Public Non-Community Systems,
Self-Supplied Industries and Private Domestic Systems

Non-Community System	POTABLE USAGE					SECONDARY USE (Ac-Ft/Yr)
	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial/ Stockwater Use (Ac-Ft/Yr)	Total Potable Use (Ac-Ft/Yr)	
UINTA COUNTY						
Dinosaur National Monument Systems						
Dinosaur Quarry	5.0	0.0	2.8	0.0	7.8	0.0
Green River Campground	0.0	0.0	1.8	0.0	1.8	0.0
Split Mountain Campground	0.0	0.0	0.8	0.0	0.8	0.0
Forest Service Systems						
East Park Campground	0.0	0.0	0.2	0.0	0.2	0.0
Iron Springs Campground	0.0	0.0	0.2	0.0	0.2	0.0
Whiterocks Campground	0.0	0.0	0.1	0.0	0.1	0.0
State Park Systems						
Red Fleet State Park	0.5	0.0	2.2	0.0	2.7	9.0
Steinaker Lake State Park	0.5	0.0	2.6	0.0	3.1	0.0
SELF SUPPLIED INDUSTRIES*	0.0	0.0	0.0	4,134.7	4,134.7	7,000.0
PRIVATE DOMESTIC SYSTEMS	300.0	0.0	0.0	0.0	300.0	0.0
UINTA COUNTY TOTALS	306.0	0.0	10.7	4,134.7	4,451.4	7,009.0

*SELF SUPPLIED INDUSTRIES: American Gilsonite Co., Chevron USA, Inc., CNG Producing, Inc., Deseret Generation and Transport Co., Flying J, Inc., Gerrity Oil Co., SF Phosphates Limited, Inc., Wembco, Inc.

Total potable M&I water use in the county is 10,717 acre-feet, while secondary use is 8,633 acre-feet; giving a total M&I water use of 19,350 acre-feet. Since the current population of Uintah County is about 24,300 the total M&I per capita use is 710 gpcd. Table 16 gives various per capita rates for public community systems. Appendix C shows data for each public community system presented in the tables.

TABLE 16
UINTAH COUNTY
Average Per Capita M&I Water Use for all Public Community Systems

CATEGORY	Average Per Capita Use (Ac-Ft/Yr)	Average Per Capita Use (GPCD)
Residential Potable Use	0.191	170
Residential Potable Plus Secondary Use	0.237	211
Total Potable Use	0.269	240
Total Potable Plus Secondary Use	0.339	303

Note: Total Potable categories include residential, commercial, institutional and industrial uses.

WASATCH COUNTY M&I WATER SUPPLIES AND USES

The Uintah Basin portion of Wasatch County includes no incorporated communities. Within this area are 9 public non-community systems. The Strawberry Reservoir area contains 3 of these systems. Table 17 gives water use for public non-community systems. There are no self-supplied industries and no private domestic wells. All of these uses amount to 53 acre-feet.

TABLE 17
WASATCH COUNTY
Water Use for Public Non-Community Systems,
Self-Supplied Industries and Private Domestic Systems

Non-Community System	POTABLE USAGE					SECONDARY USE (Ac-Ft/Yr)
	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial/ Stockwater Use (Ac-Ft/Yr)	Total Potable Use (Ac-Ft/Yr)	
WASATCH COUNTY						
Forest Service Systems						
Current Creek Campground	0.0	0.0	3.0	0.0	3.0	0.0
Soldier Creek Recreation Complex	0.0	0.0	3.8	0.0	3.8	0.0
Strawberry Administration Site	1.1	0.0	2.0	0.0	3.1	0.0
Strawberry Bay Recreation Complex	0.0	0.0	37.0	0.0	37.0	0.0
Bryants Fork Spring Association	0.2	0.0	0.0	0.0	0.2	0.0
Bryants Fork Summer Homes	0.2	0.0	0.0	0.0	0.2	0.0
Current Creek Lodge	2.5	0.5	0.0	0.0	3.0	0.0
Pine Hollow Estates	1.0	0.0	0.0	0.0	1.0	0.0
Windy Ridge Water Company	1.5	0.0	0.0	0.0	1.5	0.0
SELF SUPPLIED INDUSTRIES	0.0	0.0	0.0	0.0	0.0	0.0
PRIVATE DOMESTIC SYSTEMS	0.0	0.0	0.0	0.0	0.0	0.0
WASATCH COUNTY TOTALS	6.5	0.5	45.8	0.0	52.8	0.0